

REMARKS

Favorable reconsideration of the application is respectfully requested in light of the amendments and the following detailed discussion. As the response to this amendment, with three month extension, was due on Saturday, November 8, 2003, it is respectfully submitted that the submission of this amendment today, Monday, November 10, 2003, with a three month extension of time request, is timely. A Request for Continued Examination accompanies this amendment.

Claims 18-41 have been cancelled and claims 55, 56 and 58 have been amended to depend from claim 42. No new matter has been introduced by these amendments.

In paragraph 1 of the outstanding Office Action, the Examiner required cancellation of withdrawn claims 18-41. In response thereto, claims 18-41 have been canceled herein.

The Examiner objected to claims 55-58 as depending from a canceled claim 1. In response thereto, claims 55-56 and 58 have been amended to depend from claim 42. Claim 57 depends from claim 56, which now depends from claim 42. Therefore, it is requested that the Examiner's objection to the claims be withdrawn.

Claim 44 was rejected by the Examiner under 35 USC §112, first paragraph as containing new matter. Specifically, the Examiner rejected the inclusion of the term titanium tetraalkoxide as not being in the originally filed specification and claims. The specification does indicate the use of titanium ethoxide as a titanium source. It is thus submitted that the claim, which recites "titanium tetraalkoxide" is supported by the specification which shows titanium ethoxide, which is a titanium alkoxide. It is therefore submitted that this rejection should be reconsidered and withdrawn, in light of the amendment to claim 44.

Claims 42, 43, 45 and 55-58 are rejected under 35 U.S.C. §102(a) as being clearly anticipated by the Greenberg et al U.S. Patent No. 6,027,776 ("Greenberg"). The Examiner concluded that the features of applicant's claims could be found in the abstract, drawings, col. 3, lines 32-45, col. 4, lines 30-63, col. 5, lines 18-46, col. 7, lines 1-11, the examples and the claims.

Claim 44 stands rejected under 25 USC §103(a) as being unpatentable over Greenberg in view of US 6,110,528 to Kimura et al. Claims 46-54 stand rejected under 35 §103(a) as being unpatentable over Greenberg in view of WO 98/06675 to Sheel et al. The Examiner notes that it would have been obvious to one skilled in the art to use the precursors of Sheel in the CVD method of Greenberg, because Sheel taught that precursors enabled high conversion efficiency with low cost metal conversion compounds.

Applicants respectfully submit that the amended claims are patentable over the disclosure of Greenberg. The invention, as defined in claim 42, is a process for the production of a durable photocatalytically active coated glass in which the titania layer has a thickness of less than 40 nm and the substrate is at a temperature in the range 645°C to 720°C during the deposition of the coating.

Applicants continue to assert that claim 42 is inventive over the prior art and specifically over Greenberg in that it defines a process for the production of a photocatalytically active coated glass which is carried out within a specific narrow temperature range (645°C to 720°C) and using conditions so as to provide a relatively thin film having a thickness of less than 40 nm. Such coatings have been discovered to be durable, to be sufficiently photoactive and to exhibit lower visible light reflection than previously known coatings. There is nothing in Greenberg or

in the secondary references Kimura or Sheel to indicate the use of these particular process conditions.

Applicant first asserts that Greenberg is not a proper reference against the present application, as the dates of the Greenberg patent do not qualify it as a reference under 35 USC §102(a). Specifically, the Examiner has cited the Greenberg reference under 35 USC § 102(a). 35 USC § 102(a) states that:

A person shall be entitled to a patent unless –  
(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

The present application claims priority from UK Patent Application No. 9913315 filed June 8, 1999. The Examiner has acknowledged receipt of certified copies of the priority document; therefore applicants' priority claim has been perfected. In light of this priority date, the present invention must have been invented before that date and has, at least, a constructive invention date of June 8, 1999. This date is **before the patent date** of the Greenberg patent, and thus removes the possibility of Greenberg being a reference under 35 USC §102(a). Thus, the Examiner's application of Greenberg under 35 USC §102(a) is improper and should be withdrawn.

Even if the Greenberg patent is an effective reference against the present application, it is respectfully submitted that the present invention is distinguishable over the Greenberg patent. With regard to the temperature limitation, Greenberg's disclosure embraces a wide range from 400° C (column 5 line 46) to 800° C (column 5 line 43). The Examiner points, in particular, to Table 6 and Example H as anticipating the present claims. The claims of this application are novel over this specific disclosure in so far as they require the titania layer to have a thickness of

less than 40 nm. It is also worthy of note that Table 6 reports the results of a spray pyrolysis using titanium acetylacetonate as the titanium source.

Further, Example H of Table 6, which the Examiner cites in refuting the earlier presented arguments, indicates a titania thickness of 400 Å. The present claim 42 requires a thickness of **less than** 40nm (400Å.) Applicants assert that the Examiners' reference to this Example is improper, as the thickness cited is outside the range claimed by claim 42. In fact, all of the examples cited in Table 6 disclose titania thicknesses of at least 400Å. Thus, none of the Examples of Table 6 can be said to anticipate claim 42. As previously argued, it is improper for the Examiner to pick and choose various elements from disparate parts of an applied reference. It is thus submitted that the Examples of Table 6 are not the proper basis for an anticipation rejection of the present claims.

As previously argued, anticipation under 35 USC 102 requires the presence in a single prior art disclosure (Greenberg) of all the elements of a claimed invention, arranged as in the claim (see *Connell v. Sears, Roebuck & Co.*, 220 USPQ 193, 198 (Fed. Cir. 1983)). As noted, claim 42 requires "depositing on the surface of a glass substrate a photocatalytically active titanium oxide layer having a thickness of less than 40 nm." The deposition of such a layer at the recited thickness is not described or taught in Greenberg. Greenberg's very general disclosure of a thickness range of "from about 100 Å to 2500 Å" (column 3, lines 62-64) is not sufficient to supply this element. Moreover, Greenberg clearly teaches away from the recited thickness range, promoting the formation of thicker coatings, preferably at least 500Å (50 nm) (column 3, line 67). There is no specific example in Greenberg in which the thickness of the titanium oxide coating is less than 400 Å. Thus, the thickness range defined in claim 42 is not suggested by the

very broad range mentioned in Greenberg, let alone disclosed with *sufficient specificity* to anticipate claim 42. See MPEP §2131.03.

The above cited MPEP section requires that when a reference contains a broad range which touches or overlaps the range of the application, a case by case determination must be made as to anticipation. The MPEP indicates that the claimed subject matter must be indicated with sufficient specificity to constitute anticipation under the statute. The section further indicates that unexpected results may also render the claims non-obvious.

The claims are inventive over Greenberg because it is surprising that such relatively thin layers are photocatalytically active. The result is a coated glass substrate with a lower reflection. The production of a thinner layer provides process advantages in that less raw material is required and in so far as thinner coatings are easier to deposit. Note that in discussion of Table 6, Greenberg urges that a 625Å titania layer deposited directly on the glass has the same activity as a 400Å titania layer deposited on top of a barrier layer. The only references in Greenberg to thinner titania layers are in combination with the barrier layers. Greenberg is thus clearly teaching that thicker layers are preferred as opposed to the thin layers as depicted in the claims of the present invention. It is important to note that the disclosure of Greenberg's corresponding WO 98/41480 says that the coating is at least 400 Å thick and preferably at least 500 Å thick (with the Abstract of this WO reference indicating it must be at least 500 Å thick.)

There is nothing in the Greenberg reference that would lead one skilled in the art to the conclusion that layers of a thickness of less than 40nm would be acceptably photocatalytic. These surprising results are further proof that the thickness range (especially in conjunction with the temperature range) defined in claim 42 is not anticipated, nor rendered obvious, by the disclosure of Greenberg.

Additionally, claim 42 requires that the substrate surface be contacted with the fluid mixture when “at a temperature in the range 645°C to 720°C.” With regard to the temperature of the substrate, Greenberg merely teaches that “in the practice of the invention it is preferred to apply the PASC coating when the float ribbon is dimensionally stable e.g. below about 800°C for soda lime silica glass, and the float ribbon is at a temperature to decompose the metal-containing precursor e.g. above about 400°C ” See column 5, lines 41-46. There is nothing in Greenberg that suggests with any specificity the narrow temperature range defined in claim 42.

Again, to reiterate, the applicants' invention lies in their discovery that a durable photocatalytic **thin (< 40 nm)** coating can be produced using a temperature in the range 645°C to 720°C. This coating is surprisingly sufficiently photocatalytic to serve the intended purpose, and also has additional significant advantages as defined above. Greenberg does not anticipate this thickness and, in fact, teaches away from it.

With regard to the Kimura reference, it is respectfully submitted that it discloses processes for depositing a titanium oxide coating on the surface of a particle by precipitation from an aqueous medium. Such procedures are irrelevant to the claims of this application which require the deposition of a titanium coating on a surface by contacting it with a fluid medium at an elevated temperature. Further, even if Kimura was relevant to the present application, it would not be sufficient to overcome the deficiencies in the Greenberg reference cited above.

The above arguments regarding thickness also apply to the rejection of claim 47 and claims dependent thereon. Claim 47 defines a process for the production of a photocatalytically active coated substrate. The process comprises depositing a titanium oxide coating having a thickness of less than 40 nm on a substrate. The deposition is done by contacting a surface of the

substrate with a fluid mixture comprising titanium chloride and an ester other than a methyl ester.

For all of these reasons, claim 42 is patentable over Greenberg. In addition, claims 42-46 and 55-58 all depend from claim 42, and are patentable at least on that basis.

The rejection of claims 47 - 54 (claim 46 is separate as it depends from claim 42) as being unpatentable over Greenberg in view of Sheel is inappropriate. First, as illustrated above, Greenberg is not an effective 102(a) reference against the present invention. Thus, it is respectfully submitted that Greenberg is not available for use in the present 103(a) rejection.

Further, Sheel does not teach that the coatings are photocatalytic. Greenberg teaches the deposition of a photocatalytic titanium oxide coating by a CVD process using titanium tetrachloride, titanium tetraisopropoxide or titanium tetraethoxide in a carrier gas which may be air, nitrogen, oxygen ammonia or mixtures thereof. Even if applicable, there is no incentive in Greenberg is use anything other than a carrier gas and thereby no reason to adopt the use of ethyl acetate as proposed by Sheel.

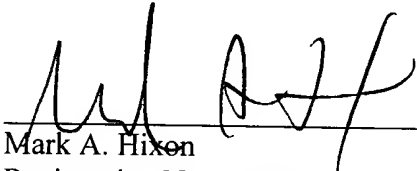
However, even if the Sheel reference were to be combined with the Greenberg reference, it would not overcome the deficiencies therein. Claim 47, as does claim 42, requires a thickness of less than 40 nm. Therefore, nothing in Greenberg anticipates, nor renders obvious the thickness as claimed in claim 47 for all of the reasons discussed hereinabove, with respect to claim 42.

For these reasons, claim 47 is patentable over Greenberg alone or in combination with Sheel. In addition, claims 48-54 all depend, directly or indirectly, from claim 47, and are patentable at least on that basis.

For all of these reasons, applicants respectfully submit that the instant amendment places the application in condition for allowance. Accordingly, it is courteously requested that the application be passed to issue.

In the event the Examiner would prefer language other than that set forth in the claims, it is requested that a telephone interview be had to assist in expediting the prosecution of the application.

Respectfully submitted,

  
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